to squeeze congestion out of a nerve, and then vigorous percussion over it, so as produce an obtunding effect; but these were out of the question at first in this case. The sixth massage seemed to rouse a slumbering soreness, and make the whole limb uncomfortable for an hour; but after this it felt better than before, and continued so. Subsequent massages after this had a similar effect. The reason of this was, without doubt, due to the detaching of adhesions which caused matting of the tissues. This required arduous work; but as suppleness and elasticity returned, the work became easier. At the twelfth visit, after forty minutes of massage to leg, thigh, and back, the patient felt that if I did any more it would certainly arouse the pain which the massage had just quieted. This was near the end of the third week, and he could run up and down stairs freely. And so the patient improved with interesting variations, pain decreasing and intervals of comfort increasing. On the thirty-first day after massage was begun he preached twice, superintended his Sunday-school (distributing presents to the children), and felt no worse for it. Sixteen massages in four weeks and a half, then a week's vacation, and he was himself again. But the external aspect of the leg, from the knee to the toes, has remained numb ever since.

Dr. A. Symons Eccles, in an article on "Massage, Rest, and Position in the Treatment of Sciatica,"[1] has reported several cases of sciatic neuritis in previously healthy people, which he treated successfully in this manner after the failure of other means. The massage consisted of *effleurage*, kneading, and percussion, and, in the intervals, the leg was suspended in a Salter swing, as this was the only position that afforded rest.

REPORT OF A CASE OF GANGRENOUS STOMATITIS, WITH A BACTERIOLOGICAL EXAMINATION.

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The case reported in this paper entered the New Haven Hospital October 26, 1892, and was in the service of Dr. W. H. Carmalt, through whose courtesy I was permitted to make a bacteriological examination.

The patient, Katie M., seven years of age, was born in New Haven, of Irish parentage. There was no history of tuberculosis or any other hereditary disease in the family. The patient had lost no brothers or sisters, and her father, mother, and four brothers and sisters were living and well. Though she had been brought up in a tenement-house the hygienic surroundings had not been particularly bad. When two years old she had a fall, striking her face on a piece of board and driving a small sliver of wood into the left malar region. The wound suppurated and remained open for two months, but finally healed. Early in the summer of 1892 she had the whooping-cough. About the middle of September, 1892, she was taken sick with typhoid fever and was confined to her bed constantly from that time.

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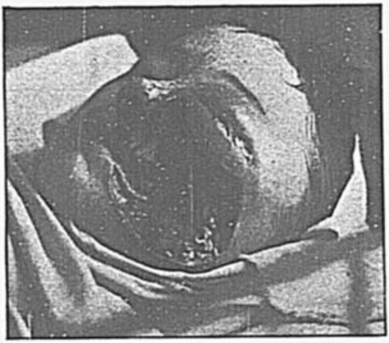
[1] London Practitioner, November, 1887.

The present illness—*i. e.*, stomatitis—dates from the middle of October, 1892, when, the parents say, the patient had what they thought was an ulcerated tooth on the left lower jaw. The ulceration began in the gum, increased with great rapidity, and soon involved the inner part of the left cheek.

The patient was seen by Dr. T. H. Russell several days before her entrance into the hospital, who describes her condition somewhat as follows: Her left cheek had a round black necrotic patch about the size of a silver dollar, surrounded by a red, swollen, almost erysipelatous inflammatory area. The parents of the patient stated that the disease had been apparently painless, and that the child was constantly picking at her teeth with her fingers, and finally pushed a finger through the necrotic patch on the cheek. After this the disease extended more rapidly, removing all the skin and muscular tissue of the left cheek and exposing the bone of the inferior and superior maxilla. The teeth on the exposed bones were loosened and fell out. The odor was extremely fetid. The appearance of the patient on entrance to the hospital can be better understood from the photograph than described.

FIG. 1.



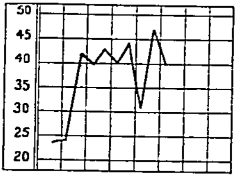
The remaining portion of the clinical history was mostly obtained from the hospital records.

On entrance, pulse 130, temperature 102.8°, respiration 25. Urine, specific gravity 1017; acid; no albumin; a considerable sediment of urates.

Oct. 30. The soft parts on the left side of the nose are almost completely gone to the median line. The cavity is bounded below by the lower border of the inferior maxilla, and above by the edge of the orbit. A large necrotic mass the size of a hen's egg was removed to-day. The tongue does not seem affected. Bowels and bladder act involuntarily. Patient lies in a kind of a stupor and does not seem in great pain.

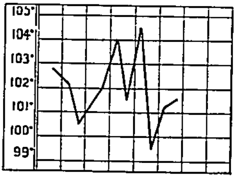
No record was made of the condition of the heart and lungs, though during the latter part of the disease the patient coughed considerably. Up to within two days of death she took nourishment well, taking over one quart of milk daily, and in addition wine whey and sherry wine. Occasional doses of Majendie's solution were given hypodermatically for relieving restlessness.

FIG. 2.



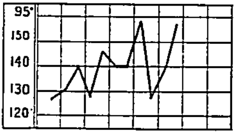
Respiratory chart.

FIG. 3.



Temperature chart.

FIG. 4.



Pulse curve.

The local treatment consisted in washing with Condy's fluid, and, in the application of charcoal poultices. Later, pure carbolic acid was painted about the necrotic area, but neither treatment had any effect in arresting the progress of the disease.

The patient died on November 1, 1892, about two weeks from the date of onset of the disease.

The causes of gangrenous stomatitis are predisposing and exciting. In infectious diseases the predisposing causes prepare the soil and the exciting causes furnish the infection.

The predisposing cause of gangrenous stomatitis is a weakened state of the body resulting from such diseases as measles and typhoid fever, combined with unhygienic surroundings. The exciting causes are local, and are not so plain. A necrosis is usually attributed to a disordered nutrition, either from the cutting off of a blood supply by pressure, as in bed-sores, or by embolism or thrombosis; or from the cutting off of trophic nerve influence, as in ulceration of the cornea in animals when the fifth nerve is cut. None of these causes, however, either pressure, embolism, thrombosis, or neuritis, apparently are present in gangrenous stomatitis, and one is driven therefore to the conclusion that the local exciting cause producing the necrosis is the existence of some organism in the tissue which, either by its direct action or by the poisons it produces, causes a necrosis of tissue. But gangrenous stomatitis is not only a necrosis, but a gangrene—that is, there is not only death of the tissue, but putrefaction, and putrefaction requires the presence of bacteria of putrefaction, therefore it must be remembered that the bacteria producing the putrefaction are not necessarily the ones producing the necrosis. In fact, if we may trust the experiments of Lingard, the bacillus which he found in cases of gangrenous stomatitis produced a necrosis of the heart muscle in rabbits, but not a gangrene. It is quite possible that the putrefactive portion of the process in gangrenous stomatitis is produced by other bacteria. The cause of the necrotic process is, however, the most important, as necrosis is the primary change.

Our knowledge of the bacteriology of gangrenous stomatitis is based on the investigation of six cases—one by Schimmelbusch, and five by Lingard.

Schimmelbusch[1] found small bacilli, often in pairs, and sometimes in long filaments growing along the boundary line of the living tissue. These bacilli grew on gelatin without liquefying it, at the temperature of the room. They did not stain by Gram's method. When injected into rabbits, they produced local abscesses only.

Schimmelbusch did not prove that his bacillus had any etiological relation to the pathological process, but only made this hypothesis probable by finding the bacillus along the border of the healthy tissue.

Lingard also found a bacillus 4–8 micromillimetres long, probably the same as the one detected by Schimmelbusch, located along the border of the healthy tissue.[2] He found this bacillus constantly present in five cases, and cultivated it outside the body, though he does not state upon what media. When inoculated into the ear of rabbits it caused great swelling and redness, and death on the tenth day.

Examination of the viscera showed characteristic changes in the pericardium, which was covered with a false membrane in which bacilli were found. There were also patches of necrosis in the ventricular wall, containing bacilli. These changes are not found in the human heart. It is possible that the differences in the results of experiments on animals obtained by Schimmelbusch and Lingard may have been because the point of inoculation was different.

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[1] Manual of Bacteriology, Sternberg, p. 466.

[2] Lancet, 1888, ii. p. 159.

The examination of the case of gangrenous stomatitis which I have reported was begun on Oct. 27th, about four days before the death of the patient. It consisted in making smear cover-glass preparations, cultures, and animal experiments; of a microscopical examination of a portion of the healthy tissue bordering on the slough, which was removed after death; and of an examination of the blood.

I. *Cover-glass preparations.* After drying and flaming some were stained with carbol-fuchsin, some by Gram's method, some with Koch's alkaline methyl-blue, and some were treated with glacial acetic acid and a subsequent gentian-violet stain. In all the specimens there were vast numbers of staphylococci, streptococci, and diplococci, and a very few long bacilli, often in groups, stained faintly by Gram's method, but more deeply by other methods.

II. *Blood.* A special examination of the fresh blood was made to detect the motile crystal-shaped bodies described by Sansom, but none were found.

A blood-count showed about 1,600,000 red corpuscles to the cubic millimetre. The number of white corpuscles was 36,363 to the cubic millimetre, or about in the proportion of one white corpuscle to forty-four red ones. The amount of hæmoglobin was about 40 per cent. of normal. The white blood-cells were mostly polynuclear leucocytes, with a few mononuclear. Specimens stained with methyl-blue showed no bacteria.

III. *Cultures.* A small loop of sterilized platinum wire was pushed as deeply as possible into the sloughing tissue, twisted around, drawn out and rubbed successively over six or eight slant tubes of agar. Cultures were thus made on agar, glycerin-agar, and Weichselbaum's agar. In two or three of the last tubes inoculated the colonies were so few and well distributed that it was easy to make pure cultures as well as to distinguish different kinds of bacteria. Tubes of agar were also inoculated from the blood of the finger, but they remained sterile. All the cultures were kept at a temperature of 33°–35° C. Many colonies developed, from which pure cultures were made. These all proved to be micro cocci, staphylococci, streptococci, and diplococci, but no colonies containing bacilli were discovered, even after repeated examination. The colonies most abundant proved, by growing in gelatin, to be the staphylococcus pyogenes aureus, the streptococcus pyogenes, and the micrococcus cereus albus.

My failure to detect bacilli may have been due to the fact that the platinum loop was not pushed into the border of the sound tissue, where the bacilli are by far the most numerous, but into the centre of the slough.

The cultures were fortunately made before any vigorous antiseptic treatment had been adopted.

The day before the death of the patient an attempt was made to make some fresh cultures, but no colonies developed in the agar tubes which had been inoculated. This was probably because a small portion of the carbolic acid saturating the slough was carried over by the platinum loop into the agar tubes.

IV. *Animal experiments.* Two rabbits (No. 1 and No. 2) on October 28th were inoculated through a subcutaneous incision in the abdominal wall, well beneath the abdominal fascia, with a piece of slough from the face of the child.

Oct. 30. The rabbits seemed stupid and did not eat much. There was an area around the point of inoculation about one inch square, much reddened and swollen in each rabbit.

Nov. 5. Both the rabbits seemed much better, but the swollen, inflamed areas mentioned above were evidently the seat of abscesses. Pus could be pressed out of them. Cover-glass preparations were made from this pus, and cultures also. The cover-glasses after staining showed abundant micrococci and staphylococci, and a very few single long bacilli. Abundant colonies of the micrococcus cereus albus developed on the agar plates, and also another large egg-shaped micrococcus which in gelatin-tube cultures presented a rapid white superficial growth without liquefaction. No colonies containing bacilli were found.

15*th*. Both rabbits are alive and well. Small nodules at the point of inoculation about the size of a pea. All signs of acute inflammation have disappeared.

Rabbit. No. 1 killed. The nodule mentioned proved to be a cheesy mass encapsulated in a wall of tough connective tissue. There was no peritonitis nor sign of former peritonitis. The heart appeared normal both macroscopically and microscopically. Nothing worthy of note was discovered in any of the viscera.

A new rabbit (No. 3) was inoculated in the ear with some of the cheesy matter in the nodule removed from rabbit No. 1. This resulted only in a slight inflammatory reaction with no swelling and very slight redness lasting only a day or two.

The encapsulated cheesy mass which was removed from rabbit No. 1 was hardened and sections made. Sections were stained by Kühne's method. A few masses of micrococci in the connective-tissue cells were found near the border of the cheesy area. No bacilli were found.

V. *Sections made from the skin covering the malar bone of child.* A slough of skin covering the malar bone at the border of the necrotic area was removed after the death of the child. (No autopsy was permitted.) This was hardened in alcohol and imbedded in celloidin. Sections were made and stained by Gram's method, with carbol-fuchsin, and by Kühne's method. The last method showed up well the pathological process as well as the bacteria growing in the tissue. The sections, as a rule, presented three areas—an outer one of necrotic tissue, a middle one of infiltration with round cells, and an inner one of normal tissue. The bacilli were most abundant and stained most deeply along the border of the necrotic area. In the interior of the necrotic area they did not take the stain so readily. The single bacilli measured 2½ micromillimetres to 3½ micromillimetres in length, but were often joined end-to-end in long strings. These bacilli were, in many places, the only bacteria seen, and were packed closely together to the exclusion of all other bacteria along the line of necrosis. This gave one the impression that they were eating directly into the sound tissue. In the necrotic area, especially near the outer part, were seen micrococci and streptococci.

The bacilli were not entirely confined to the necrotic area, but could be seen infiltrating the sound connective tissue, though in much less abundance than along the line of necrosis. The bacilli were stained especially well by Gram's method. In using this method, however, great care needs to be taken not to decolorize too much.

My conclusions differ from those of Schimmelbusch in that the bacilli found by him did not stain by Gram's method, and from those of Lingard in that his bacilli were somewhat longer than those which I found. These differences in staining peculiarities and size may possibly be ascribed to differences of technique which further investigations may harmonize.

The finding of a bacillus characteristic in appearance, staining with Gram's method, far outnumbering all other kinds, and growing in innumerable numbers along the border of the necrotic area, in one case, certainly does not prove that it is the cause of the disease. It does, however, confirm one of the conclusions of Schimmelbusch and Lingard, and in view of the scanty literature on the subject seems worth recording.